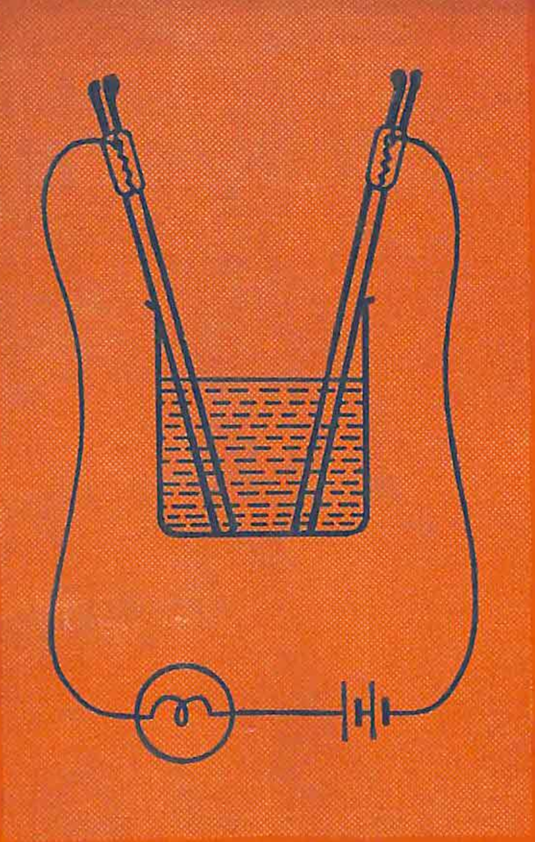
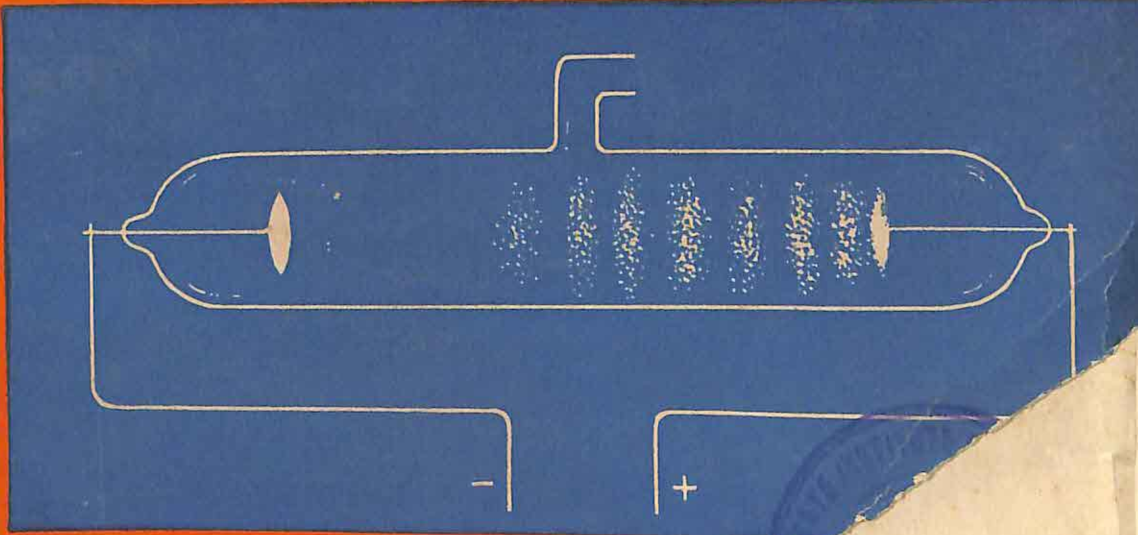


SCHOOL CHEMISTRY

Class 8

LABORATORY MANUAL



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EXPERIMENTAL EDITION

SCHOOL CHEMISTRY

CLASS 8

LABORATORY MANUAL

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STATE INSTITUTE OF EDUCATION
Govt. of West Bengal.

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1969

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RESEARCH AND TRAINING

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CLASS 8

LABORATORY MANUAL

Prepared by

NCERT Chemistry Study Groups

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PREFACE

The present edition is part of the continuing effort being made by the Study Groups in Chemistry set up under the National Council of Educational Research and Training, Ministry of Education, Government of India, in bringing out books in chemistry, in pursuance of the Education Commission's recommendation that chemistry and other sciences be taught as separate disciplines in Indian schools. The experiments included in this manual have been designed to stimulate the student's interest in chemistry and develop his capacity for observation and correct inference. Evidently, these experiments envisage the need for a regular laboratory equipped with facilities for carrying them out. The experiments have been designed to enable correlation with the material presented in the text. Wherever it is felt that it is not possible to provide a large number of sets for student experiments, necessary demonstrations have been designed to supplement the laboratory work. It is hoped that this laboratory manual would, to a large extent, fulfil the student's needs at this level.

The members of the Study Groups are grateful to Dr. D. S. Kothari, Chairman, University Grants Commission and Chairman, NCSE, for his encouragement and to the NCERT, for providing funds to make the publication of this book possible. They are also grateful to Dr. L. S. Chandrakant, Joint Secretary, Ministry of Education, Government of India and Secretary, NCSE, and to Dr. S. K. Mitra, Joint Director, NCERT, for their encouragement and continued interest in the working of the Study Groups.

They appreciate the services of Sri G. Sivaram, artist, for his illustrations.

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Page		*For*	*Read as*
40	Under Materials required	magnesium chloride	magnesium sulphate ammonium chloride

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1

The Bunsen burner

In this experiment you will study the Bunsen burner and its various parts and learn its use for heating purposes.

Materials required

Bunsen burner

Rubber tubing–1 metre

Bent glass tube

Box of matches

Gas supply

Nichrome wire

Glass rod

Pair of tongs

Procedure

Study the various parts of the Bunsen burner (Fig. 1) and assemble them as demonstrated by your teacher.

Connect the Bunsen burner to the gas tap with a rubber tubing. Close the air-inlets of the burner. Open the gas tap and light the gas (Keep your face away from the burner). Describe the flame observed.

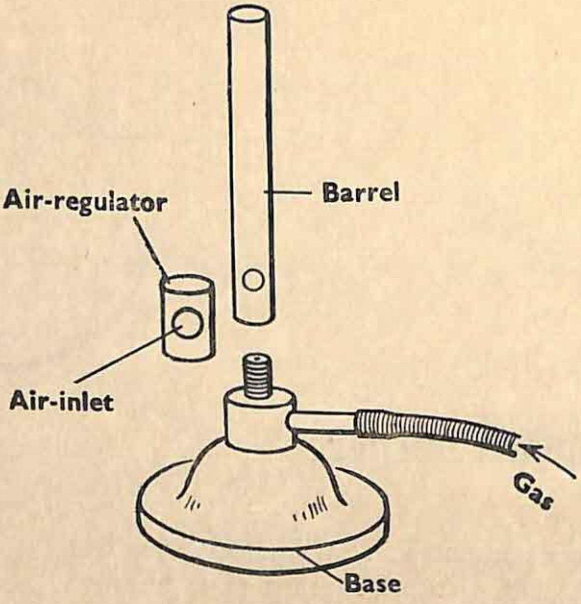

Fig. 1 *Bunsen burner*

Hold a glass rod at the tip of the flame and remove it after about half a minute. What do you find on the rod?

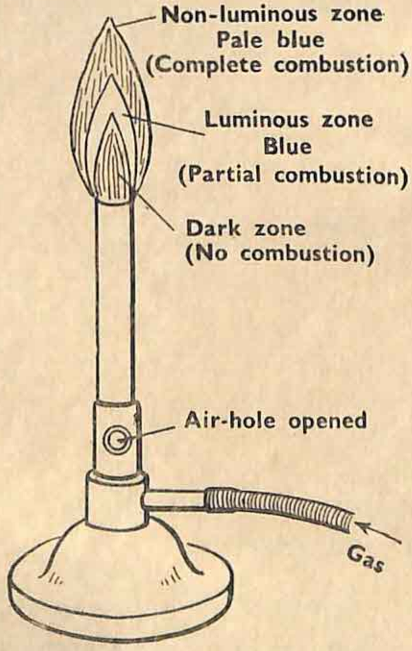

Fig. 2 *Non-luminous flame*

Open the air-inlets gradually to allow more and more air to mix with the gas until a steady, non-luminous flame is obtained (Fig. 2). Observe the changes in the size, colour and zones of the flame.

Hold a bent glass tube with a pair of tongs and introduce one end of it in each zone of the flame. Hold a lighted match stick at the other end (Fig. 3). What happens? What does this show?

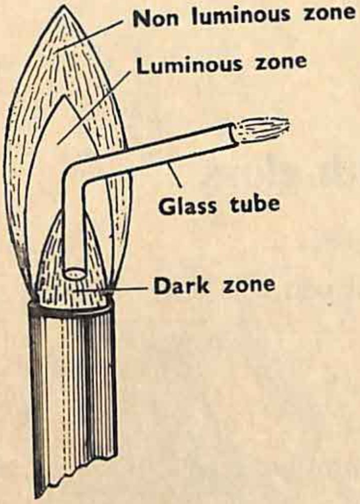

Fig. 3 *Testing for the presence of unburnt gas.*

Hold a piece of nichrome wire in the various zones of the flame and note in which zone the wire glows most intensely. What do you infer from this?

Repeat the experiment with the air–inlets closed.

Questions

1. Describe the flame obtained when the air-inlets are (a) closed; and (b) opened.
2. Which flame would you use for heating purposes? Why?

2

Working with glass

In this experiment you will learn cutting, drawing and bending of glass tubing.

Materials required

Glass tubing (5 mm diameter)	60 cm
Burner with fish tail attachment	
Glass cutting file	
Asbestos sheet	
A piece of cloth	

Procedure

A. Cutting glass tubing

Place the glass tubing on the table and hold it firmly. Using a glass cutting file, make a sharp scratch on the tubing at the place where it is to be cut (Fig. 4).

Place your thumbs together opposite the scratch. Hold the tubing firmly and bend to break it at the scratch. Use a piece of cloth to hold the tubing.

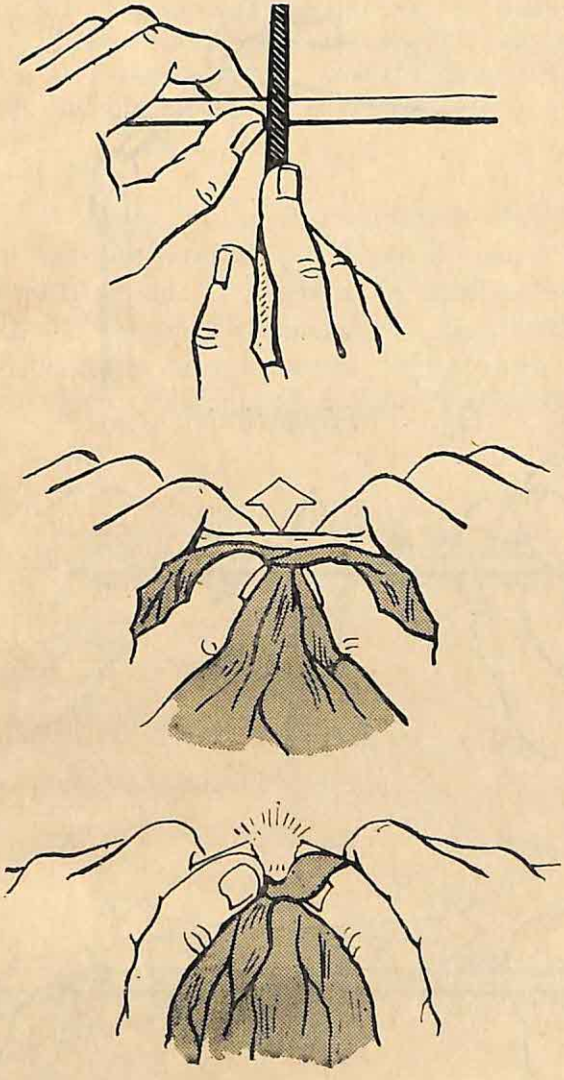

Fig. 4 *Cutting glass tubing*

To fire-polish the freshly cut edges, hold one end of the glass tubing in the hottest part of a burner flame and rotate the tubing clockwise and anti-clockwise until the edges are rounded (Fig. 5). Do not fire-polish for a long time. Otherwise the end of the tube begins to close.

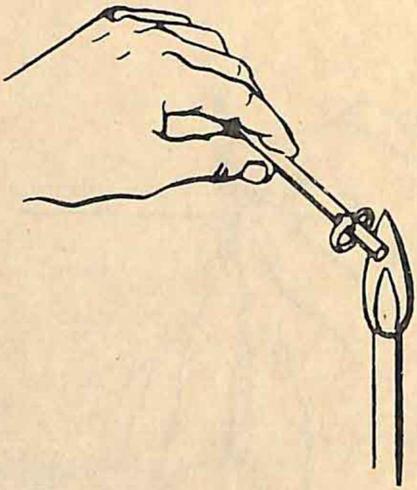

Fig. 5 *Fire-polishing edges*

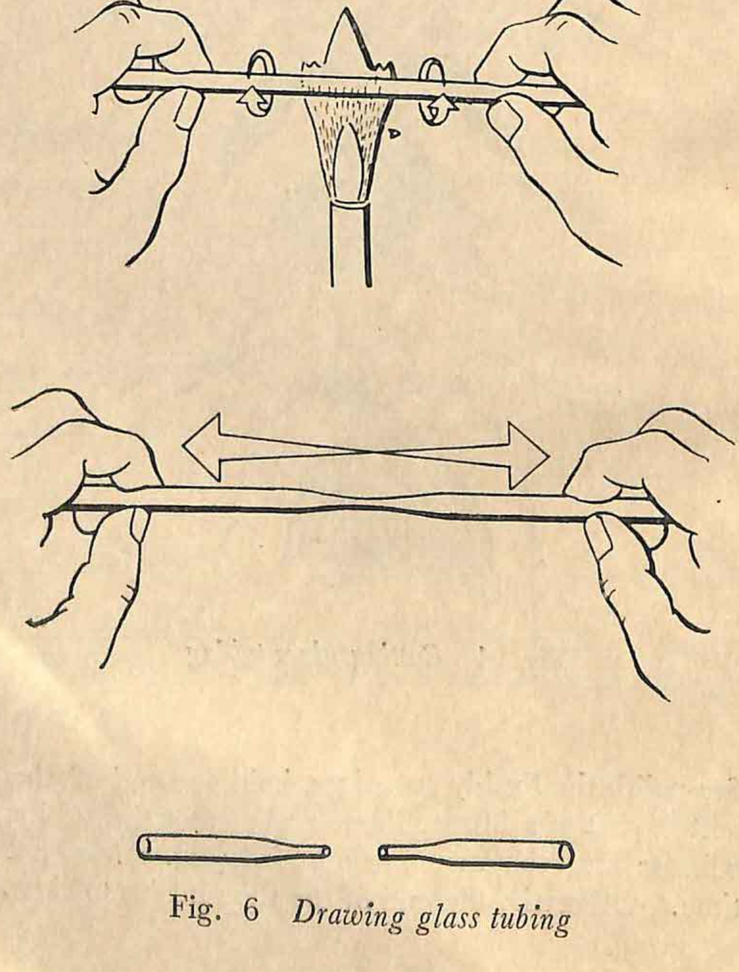

Fig. 6 *Drawing glass tubing*

B. *Drawing glass tubing*

Hold the glass tubing in the hottest part of the non-luminous flame and rotate it (Fig. 6). When the glass has become quite soft, take it out of the flame and pull the tubing until the required diameter is obtained. Cool the tubing on an asbestos sheet. Cut the glass in the middle of the drawn out portion and fire polish the sharp ends.

C. *Bending glass tubing*

Heat the glass tubing in the non-luminous flame of the fish tail burner, keeping it constantly rotating. When the glass has softened, take out the tubing from the flame and bend it by applying uniformly gentle pressure with both the hands on either side of the heated zone (Fig. 7). When the desired bend has been obtained, hold it in the luminous flame of the burner for a short while and then allow it to cool on an asbestos sheet.

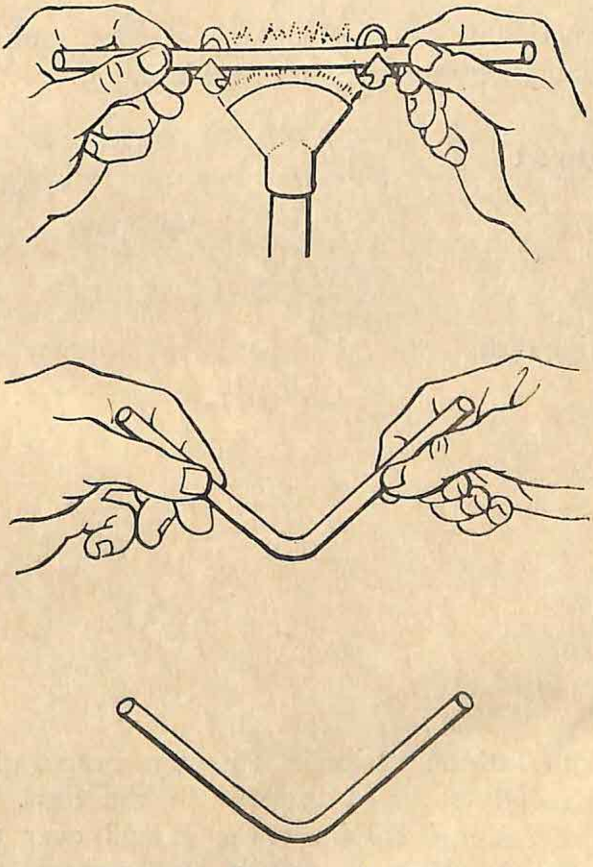

Fig. 7 *Bending glass tubing*

3

Purification of a substance by sublimation

In this experiment you will obtain a pure sample of camphor from the crude sample by the process of sublimation.

Materials required

- Burner
- Sand bath
- Evaporating dish
- Funnel
- Cotton
- Spatula
- Tripod

- Camphor

Procedure

Place a sand bath on a tripod. Keep an evaporating dish on the sand bath and place about 5 g of camphor in the dish. Insert a cotton plug in the stem of a funnel and invert the funnel over the evaporating dish as shown in Fig. 8. Heat the dish gently for about 10 minutes.

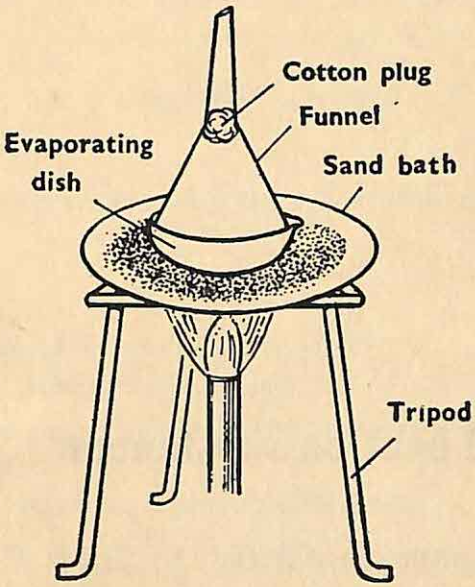

Fig. 8 *Purification by sublimation*

Allow the dish and its contents to cool. Take out the funnel carefully and scrape off the sublimate sticking to the funnel with a spatula.

4

Action of heat on substances

In this experiment you will study the action of heat on some substances.

Materials required

Hard glass test tubes (small size)	4
Test tubes	2
Test tube stand	
Test tube holder	
Glass rod	
Splinter	

Copper (II) sulphate
Copper (II) carbonate
Lead nitrate
Zinc oxide
Litmus papers (red and blue)
Cobalt chloride paper
Lime water

Procedure

Take about 0.5 g of copper (II) sulphate in a dry hard glass test tube. Heat it gently in the beginning and then strongly. Note any change in the colour of the substance. Carefully test the gas evolved, if any, with (a) moist blue and red litmus papers, (b) lime water and (c) a glowing splinter. Record your observations. If any liquid droplets are found condensed on the cooler parts of the test tube, test with cobalt chloride paper. Record your observations.

Allow the test tube to cool to room temperature. Add one or two drops of water to the residue. What do you observe?

Add about 1 ml of water and shake well. Test the contents with blue and red litmus papers.

Repeat the experiment with the other substances and record your observations.

Question

Indicate which of the substances you heated

i) return to the original state on cooling,

ii) decompose but are reformed when the products of decomposition are brought together, and

iii) seem to have undergone a permanent change.

5

The use of a balance

In this experiment you will determine the weight of a given object to the nearest centigram using a balance.

Materials required

Balance

Box of weights

10 pea nuts

Procedure

Level the base of the balance by adjusting the levelling screws till the plumb line is vertical (Fig. 9.1). Gently release the beam of the balance (keep the shutters closed) and see that the pointer swings equally on either side of the scale. If not, report to your teacher and get it properly adjusted.

Determination of the weight of the given objects

Place the objects to be weighed on the left pan. Using the forceps remove from the weight box a weight you think is slightly heavier than the objects (e. g. 10 grams) and place it on the right pan. Gently release the balance and see which way the pointer swings. Note that it always

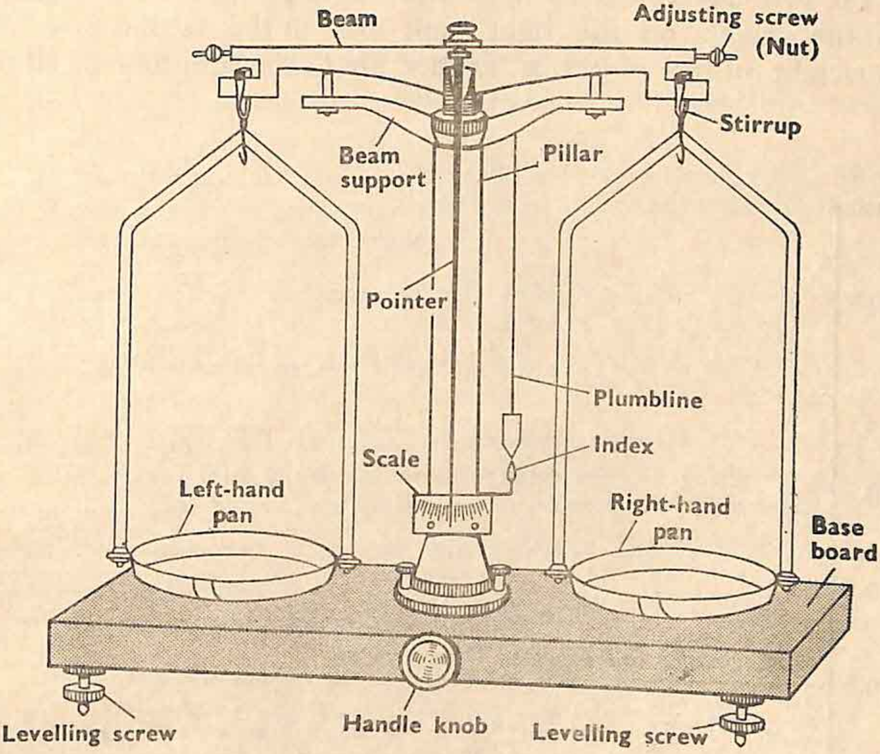

Fig. 9.1 *A balance*

swings to the side which is too light. Gently lower the balance beam again. If the 10 gram weight is found to be too heavy remove it and place the next smaller weight on the right pan. Again release and note which way the pointer swings. If any weight is too heavy remove only the last weight you put on; if any weight is too light, leave the last weight on the pan, and add the next smaller weight. Continue this process until the gram weight has been tried. Check that the fractional weights are in their correct order :–

500, 200, 200, 100, 50, 20, 20, 10, milligrams. Continue the weighing procedure down this series of fractional weights until either

a) the pointer again swings equally on either side of the centre mark (do not wait for the pointer to come to rest)

or b) the pointer swings to the right, but the addition of 10 mg makes it swing to the left. Remove the extra 10 mg.

In the first case you know the weight of the object to be thes um total of all the weights on the right pan; and in the second case you know the weight of the object is greater than the sum total of all the

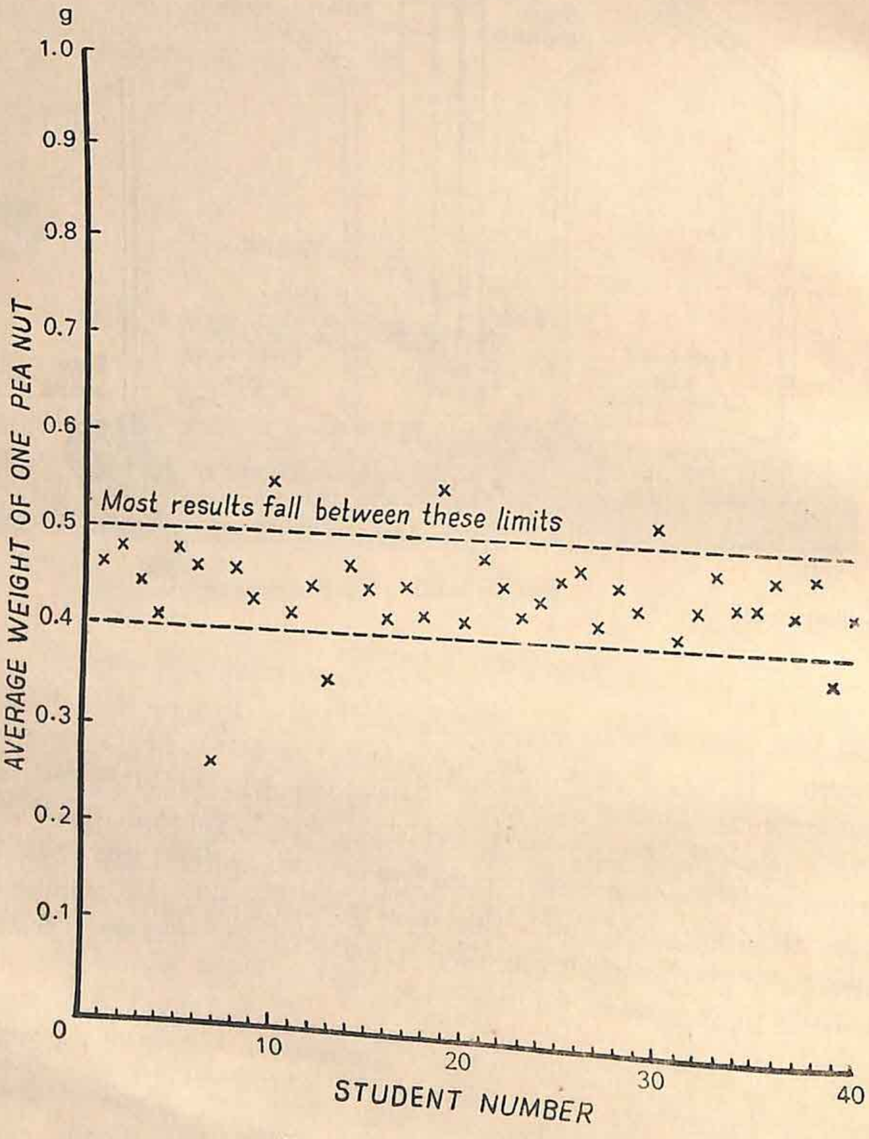

Fig. 9.2 *Class results*

weights, but by less than 10 mg e.g., greater than, say, 5.87 g but not as much as 5.88 g. Write down the smaller weight.

Questions

1) What is the average weight of one pea nut ?

2) Why is it a waste of time to calculate your answer to more than two decimal places ?

3) Draw the axes of a graph such as the one shown in Fig. 9.2. Label the vertical axis : "Average weight of one pea nut" and mark the scale in divisions of 0.1 g from zero to 1.0 g.

   Label the horizontal axis "Student number" and mark the scale to give 40 divisions.

   Record the class results with the help of the teacher using Fig. 9.2 as a guide.

4) Most results will be clustered about a certain weight. Draw on your garph two lines (as shown in the sample) between which most results will be. What is the lower weight limit ? What is the upper weight limit ?

5) The weight of a pea nut may vary. What is the extent of the variation in your experiment ?

6) One or two results fall outside the 2 limiting lines. Can you explain why?

6

Change in weight on heating-I

In this experiment you will heat a given sample of hydrated barium chloride and determine the percentage gain or loss in weight.

Materials required

Crucible with lid	Hydrated barium chloride
Pair of tongs	
Clay pipe triangle	
Tripod	
Burner	
Balance	
Weight box	
Desiccator	

Precedure

Place the crucible with the lid partially covered on the clay pipe triangle kept on a tripod. Heat strongly for about 15 minutes. Remove the crucible and the lid with a pair of tongs and place them in a desiccator to cool. Then weigh the crucible with the lid to the nearest centigram and record the weight.

Transfer about 1 g of hydrated barium chloride to the crucible, and weigh again along with the lid and record the weight. Place the crucible on the clay pipe triangle. Cover it partially with the lid (Fig. 10).

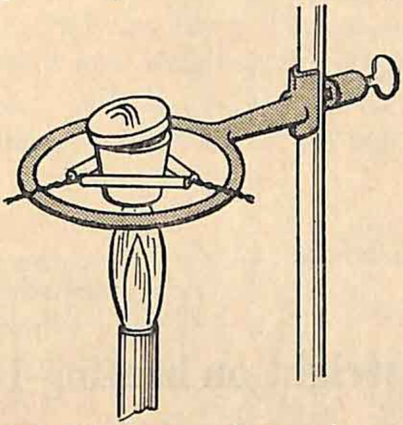

Fig. 10 *Heating a substance in a crucible*

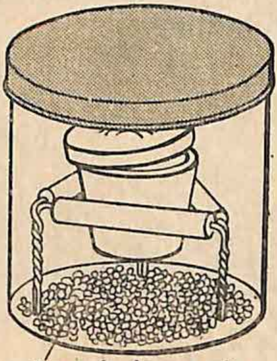

Fig. 11 *A desiccator*

Heat the crucible first gently with a small flame and then strongly for about half an hour. Transfer the crucible and its contents along with the lid to the desiccator (Fig. 11) and allow to cool. Weigh the crucible and its contents along with the lid again. Repeat heating, cooling and weighing until a constant weight is obtained.

From the data calculate the percentage loss or gain in the weight of hydrated barium chloride on heating.

Question

Using the data and assuming the formula of anhydrous barium chloride to be $BaCl_2$, determine the formula of hydrated barium chloride.

7

Change in weight on heating-II

In this experiment you will determine the loss or gain in the weight of a magnesium ribbon on heating.

Materials required

- Burner
- Pair of tongs
- Crucible with lid
- Clay pipe triangle
- Balance
- Weight box
- Desiccator
- Sand paper
- Tripod
- Magnesium ribbon

Procedure

Find the weight of the empty crucible with lid as in the previous experiment. Clean a magnesium ribbon (10 cm long) with sand paper. Wind it into a small coil and place it in the crucible and weigh along with the lid.

Place the crucible on a clay pipe triangle kept on a tripod. Heat it with a low flame in the beginning and then raise the flame gradually until the magnesium ignites. Raise the lid for a few minutes at a time with a pair of tongs so as to admit air. Take care that as little smoke as possible escapes. When the magnesium is completely burnt to ash, remove the lid and heat the crucible strongly for about three minutes. Cool the crucible with the lid in a desiccator and weigh again. Repeat heating, cooling and weighing until a constant weight is obtained. Determine the loss or gain in the weight of the magnesium ribbon on heating.

Question

Using the data determine the formula of magnesium oxide.

Atomic weight of magnesium = 24.0
Atomic weight of oxygen = 16.0

8

Electrical conductivity of solids

In this experiment you will test the electrical conductivity of different substances.

Materials required

Dry cells (1. 5 volts)	3
Torch bulb (3 volts)	
Bulb holder	
Connecting wire	
Crocodile clips	2
Carbon electrodes	
Asbestos sheet	
Copper strip	(6 x 2 cm)
Iron strip	(6 x 2 cm)
Lead strip	(6 x 2 cm)
Cardboard strip	(6 x 2 cm)
Glass rod	
Copper (II) sulphate crystal	
Alum crystal	
Wire with plastic insulation	
a) both ends insulated	10 cm
b) one end bared to an extent of 1 cm	10 cm
c) both ends bared to an extent of 1 cm	10 cm

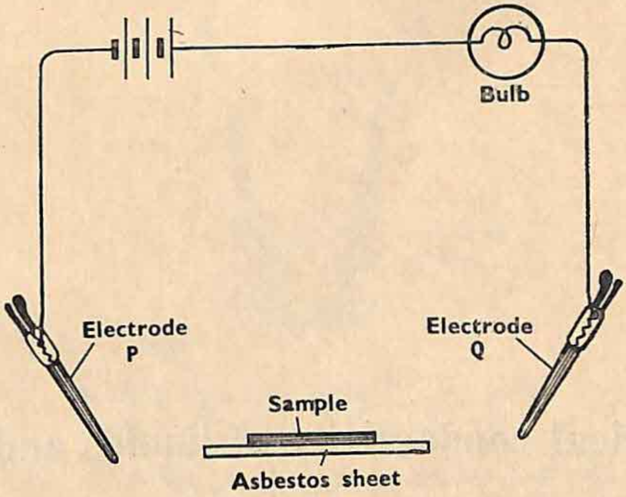

Fig. 12 *Electrical conductivity of solids*

Procedure

Connect the torch bulb and dry cells in series as shown in Fig. 12. Bring the electrodes P and Q in contact with each other. See whether bulb glows. Place a copper strip on an asbestos sheet. Touch one end of the strip with the electrode P and the other with the electrode Q. Note whether the bulb glows. Repeat the experiment with the other materials provided and record your observations in the following table.

Material between the electrodes P & Q	Does the bulb glow ?	Does the substance conduct electricity ?

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Question

Based on your observations, classify the substances into conductors and non-conductors of electricity.

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9

Electrical conductivity of liquids and solutions

In this experiment you will test the electrical conductivity of some liquids and solutions.

Materials required

Dry cells (1.5 volts)	2
Connecting wire	
Crocodile clips	2
Torch bulb (3 volts)	
Bulb holder	
Copper electrodes (10 cm × 2.5 cm × 0.2 cm)	2
Beakers (100 ml)	3

- Benzene
- Distilled water
- Alcohol
- Kerosene
- Aqueous solutions of
    - hydrochloric acid
    - sodium hydroxide
    - potassium iodide
    - sugar
- Solution of hydrogen chloride in benzene

Procedure

Set up the apparatus and make the electrical connections as shown in Fig. 13. Check the connections by bringing the copper electrodes in contact with each other. Dip the electrodes in distilled water taken in a

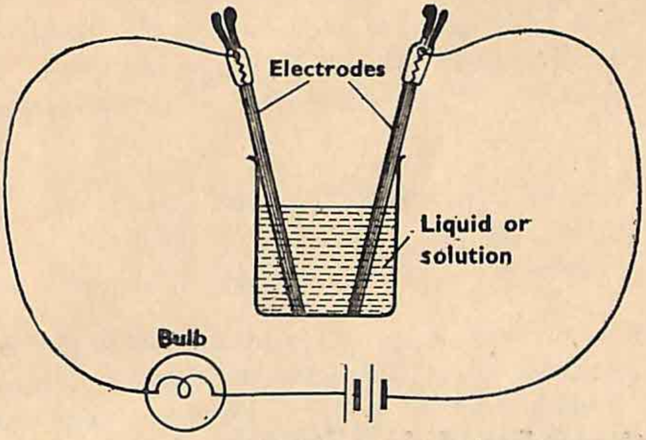

Fig. 13 *Electrical conductivity of liquids and solutions*

beaker. Record your observations. Wash and dry the electrodes. Repeat the experiment using other liquids and solutions. Tabulate your observations as follows.

Solution or liquid	Does the bulb glow ?	Does the substance conduct electricity ?

Question

Based on your observations classify the substances into conductors and non-conductors of electricity.

10

Reactions involving ions

In this experiment you will study the reactions between some salts in aqueous solution and learn to write ionic equations.

Materials required

Test tubes 6
Graduated test tube

Barium nitrate
Barium carbonate
Barium sulphate
Potassium chloride
Ammonium chloride
Aqueous solutions of
- barium chloride
- barium nitrate
- potassium sulphate
- sodium sulphate
- ammonium sulphate
- sodium carbonate
- potassium carbonate
- ammonium carbonate

Procedure

A. Test the solubilities of each of the given solid substances separately in water. If the substance is soluble, indicate the ions that are present in the solution.

B. Take about 5 ml of barium chloride solution in each of six test tubes. Add an equal volume of potassium sulphate solution to the first test tube. Note what happens. Write the equation for the reaction if any, that has taken place, keeping in mind that aqueous solutions of salts contain ions.

Similarly, add about 5 ml of sodium sulphate and ammonium sulphate solutions separately to two other test tubes containing barium chloride solution. Note what happens. Write the equations.

With the help of the information obtained in A about solubility predict which ions may not have taken part in the reactions. Mark these ions as **spectator ions** and strike them out on both sides of the equation. Compare the net equations. What do you conclude ?

Repeat the experiment by adding sodium, potassium and ammonium carbonate solutions separately to each of the remaining test tubes containing barium chloride solution. Record your observations and write the net ionic equations.

C. Repeat all the reactions given in B using barium nitrate solution instead of barium chloride. Record your observations and write the net ionic equations.

11

Detection of hardness

In this experiment you will test different samples of water and find whether they give lather easily with soap or not.

Materials required

Test tubes 3
Dropper
Graduated test tube
Corks 3

Soap solution
Distilled water
Well water
Sea water

Procedure

Take 2 ml of distilled water in a test tube. Add one drop of soap solution to it. Close the test tube with a cork and shake vigorously. See if a lather which persists for atleast two minutes is formed. If not, add one more drop of soap solution and shake. Continue adding the drops and shaking until a lather persisting for two minutes is formed. Count and record the number of drops of soap solution added.

Repeat the experiment with the other samples of water. Find which of them gives lather with the same number of drops of soap solution as distilled water.

12

Cause of hardness of water

In this experiment you will find out which of the substances, when dissolved in water, cause hardness.

Materials required

Test tubes	7
Corks	7
Dropper	
Graduated test tube	

Soap solution
Distilled water
Aqueous solutions of
- sodium bicarbonate
- sodium chloride
- calcium bicarbonate
- calcium chloride
- sodium sulphate
- magnesium sulphate

Procedure

Take 2 ml of distilled water in a test tube and determine the number of drops of soap solution required to give a two-minute lather (i. e., lather persisting for at least two minutes) with it.

Repeat the experiment with 2 ml of solutions of sodium bicarbonate, calcium bicarbonate, sodium chloride, calcium chloride, sodium sulphate and magnesium sulphate. Find out which of the solutions give lather with the same number of drops of soap solution (as required in the case of distilled water) and which do not. Record your observations.

Question

1. Based on your observations,
   - a) which ions, present in the different solutions, cause hardness in water ?
   - b) which ions do not cause hardness ?

13

Removal of hardness in water

In this experiment you will learn how to remove hardness in water.

Materials required

Hard glass test tubes	3
Test tubes	3
Test tube holder	
Funnel	
Funnel stand	
Filter papers	3
Burner	
Box of matches	
Graduated test tube	

- Soap solution
- Aqueous solutions of
  - calcium bicarbonate
  - calcium chloride
  - magnesium sulphate
  - sodium carbonate

Procedure

Take 2 ml of distilled water in a test tube. Find the number of drops of soap solution required to give a two-minute lather.

Take 5 ml of calcium bicarbonate solution in a hard glass test tube and boil it for one or two minutes and cool. What do you observe ? Filter and collect the filtrate in a test tube. Take 2 ml of the filtrate in another test tube. Add the same number of drops of soap solution as you did to distilled water. Shake well and see if any lather is formed.

Take 5 ml of calcium chloride solution in a hard glass test tube and boil it for one or two minutes and cool. What do you observe? Filter and collect the filtrate in a test tube (if filtration is not required, use the solution directly). Take 2 ml of the filtrate in a test tube and add the same number of drops of soap solution as above. Shake well and see if lather is formed.

Repeat the experiment with magnesium sulphate solution and record your observations.

Take 5 ml of calcium bicarbonate solution in a test tube and add to it about 5 ml of sodium carbonate solution. Filter and take 2 ml of the filtrate in another test tube and add the same amount of soap solution as added earlier and see if lather appears.

Repeat the experiment with calcium chloride and magnesium sulphate solutions. Record your observations.

Questions

1. In which of the solutions you used, is hardness removed by boiling? In which of the solutions it is not removed?
2. Which of the solutions need chemical treatment for the removal of hardness?

14

Composition of Water

In this experiment you will determine the volume composition of water.

Materials required

Cup voltameter		Sodium sulphate
Graduated tubes	2	
Battery (4 volts)		
Beaker (250 ml)		
Connecting wire		
Stop clock		
Plug key		
Splinters		

Procedure

Fill a cup voltameter to half its depth with water containing a small amount of sodium sulphate (to make the water conducting). Fill two graduated tubes with this water and invert the tubes over the electrodes of the voltameter. See that there are no air bubbles in the tubes. Make the electrical connections as shown in Fig. 14.

After making the connections, mark the graduated tubes as A and C to indicate the anode and cathode respectively. Pass the current through the solution by plugging in the key. Observe the collection of the gases at the electrodes.

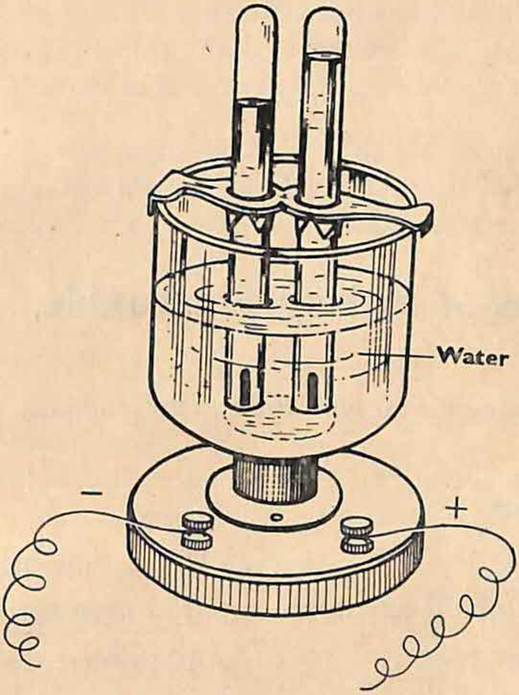

Fig. 14 *Composition of water by volume*

After passing the current for 5 minutes, remove the key. Measure the volumes of the gases collected at the electrodes.

Plug in the key again and pass current for another 5 minutes. Measure the volumes of the gases.

Close the mouth of the tube over the anode with your thumb (or with a cork) while the mouth of the tube is still under the solution. Take out the tube and turn its mouth upwards. Identify the gas in it by introducing a glowing splinter.

Similarly identify the gas collected at the cathode by introducing a burning splinter into the tube.

Question

1. What is the volume ratio of the gases liberated in this experiment? Is this ratio fixed or variable?

15

Reactions of hydrogen peroxide

In this experiment you will study some reactions of hydrogen peroxide.

Materials required

- Test tubes 5
- Hydrogen sulphide generator
- Graduated test tube
- Splinter
- Dilute sulphuric acid
- Hydrogen peroxide solution
- Manganese dioxide
- Aqueous solutions of
    - lead nitrate
    - potassium iodide
    - iron (II) sulphate
    - potassium permanganate

Procedure

Take 2 ml of lead nitrate solution in a test tube and pass hydrogen sulphide gas through it. A black precipitate of lead sulphide is formed. Allow the precipitate to settle. Decant the supernatant liquid. Add 2 to 3 ml of hydrogen peroxide solution to the precipitate and shake the test tube vigorously. Observe what happens.

Take 2 ml of potassium iodide solution in a test tube. Add a few drops of dilute sulphuric acid to it and then 2 ml of hydrogen peroxide solution. What happens?

Take 2 ml of iron (II) sulphate solution in a test tube. Note the colour of the solution. Add 2 ml of dilute sulphuric acid to it and then 2 ml of hydrogen peroxide. Observe what happens.

Take 2 ml of potassium permanganate solution in a test tube and note its colour. Add 2 ml of dilute sulphuric acid and then 2 ml of hydrogen peroxide solution to it. Note what happens.

Take 3 ml of hydrogen peroxide solution in a test tube. Add a pinch of manganese dioxide to it. Observe what happens. Introduce a glowing splinter into the test tube. What happens? What is the gas evolved?

16

Some reactions of aqueous solutions of chlorine, bromine and iodine

In this experiment you will study some reactions of chlorine, bromine and iodine in aqueous solution.

Materials required

Test tubes 6
Test tube stand
Graduated test tube
Dropper

Carbon tetrachloride
Starch papers
Litmus papers (red and blue)
Petals of flowers
Aqueous solutions of
- chlorine
- bromine
- iodine
- iron (II) sulphate
- ammonium thiocyanate
- hydrogen sulphide

Procedure

i) Take 2 ml of the chlorine solution in a test tube. Note its colour and smell. Test the solution with litmus and starch papers and note the change, if any.

ii) Take 2 ml of chlorine solution in a test tube and add 2 ml of carbon tetrachloride. Shake well. What do you observe ?

iii) Take 2 ml each of iron (II) sulphate and iron (III) sulphate solution in separate test tubes and add 2 ml of ammonium thiocyanate solution. See what happens.

Take 2 ml of iron (II) sulphate solution in a test tube and add 2 ml of chlorine solution. Shake well and add 2 ml of ammonium thiocyanate solution. See what happens.

iv) Take 2 ml of hydrogen sulphide solution in a test tube. Note its colour and smell. To this solution add, dropwise, 2 ml of chlorine solution. What do you observe ?

v) Drop the petals of flowers in a test tube containing chlorine solution. What do you observe ?

Repeat the above tests with solutions of bromine and iodine.

Record your observations in the table given below.

Reaction	Observation		
	Chlorine solution	Bromine solution	Iodine solution

Questions

1. Write ionic equations for the reactions of chlorine, bromine, and iodine with iron (II) sulphate and hydrogen sulphide.
2. Name a colour test given by iodine but not by chlorine.
3. Carbon tetrachloride, when shaken with bromine and iodine solutions, becomes coloured. Why ?

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Some reactions of chloride, bromide and iodide ions

In this experiment you will study some reactions of chloride, bromide and iodide ions in aqueous solutions.

Materials required

Test tubes 6
Test tube stand
Test tube holder
Glass rod
Watch glass
Magnifying lens
Graduated test tube
Test tube brush

Sodium chloride
Potassium bromide
Potassium iodide
Concentrated sulphuric acid
Manganese dioxide
Silver nitrate solution
Ammonium hydroxide
Litmus papers (blue and red)
Starch paper
Starch-potassium iodide paper
Distilled water

Procedure

i) Place a few crystals of sodium chloride on a watch glass. Observe the colour. Note the shape of the crystals using a magnifying lens.

ii) Take 1 g of sodium chloride in a dry test tube and add 1 ml of concentrated sulphuric acid. Warm the test tube and smell carefully the gas evolved. Test the gas with (a) a glass rod moistened with ammonium hydroxide (b) starch paper, (c) starch-potassium iodide paper and (d) moist litmus papers.

iii) Take about 0.5 g of sodium chloride in another test tube, add 0.5 g of manganese dioxide and 2 ml of concentrated sulphuric acid. Heat the test tube. Note the colour and smell cautiously the gas evolved and test it as in (ii) above.

Dissolve about 1 g of sodium chloride in 10 ml of distilled water and use this solution for tests (iv) and (v).

iv) Take 2 ml of sodium chloride solution in a test tube and add 2 ml of silver nitrate solution to it. Note the colour of the precipitate obtained. Divide the precipitate into two portions. Add dilute nitric acid to the first portion. Observe the changes, if any.

To the second portion, add ammonium hydroxide dropwise in excess and shake well. What happens to the precipitate ?

v) Take about 2 ml of sodium chloride solution in a test tube and add 2 ml of lead nitrate solution to it. Note the colour of the precipitate obtained. Now add 5 ml of water to the precipitate and heat. What happens ? Allow the contents to cool. What do you observe ?

Repeat all the above tests with potassium bromide and potassium iodide solutions.

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Reactivity of chlorine, bromine and iodine

In this experiment you will compare the reactivity of chlorine, bromine and iodine.

Materials required

Test tubes 6
Test tube stand
Graduated test tube

Carbon tetrachloride
Aqueous solutions of
  chlorine
  bromine
  iodine
  potassium chloride
  potassium bromide
  potassium iodide

Procedure

(i) Take 2 ml of potassium chloride solution in a test tube and add 2 ml of chlorine solution to it. Note the colour change, if any. Now add 1 ml of carbon tetrachloride and shake well. Record your observations.

(ii) Take 2 ml of potassium bromide solution in a test tube and add 2 ml of chlorine solution to it. Note the colour change, if any. Add to this 1 ml of carbon tetrachloride and shake well. Note any change in the colour of the carbon tetrachloride layer.

(iii) Take 2 ml of potassium iodide solution in a test tube and add 2 ml of chlorine solution to it. Note the colour change, if any. Add to this 1 ml of carbon tetrachloride and shake well. Note any change in the colour of the carbon tetrachloride layer.

Repeat the above tests using bromine and iodine solutions respectively. Record your observations in a tabular form.

Question

Based on your observations, arrange the elements chlorine, bromine and iodine in the increasing order of their reactivity.

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Some reactions of alkali metal hydroxides

In this experiment you will study some reactions of alkali metal hydroxides.

Materials required

Boiling tubes	2
Test tubes	6
Test tube stand	
Glass rod	
Graduated test tube	

Sodium hydroxide pellets
Potassium hydroxide pellets
Concentrated hydrochloric acid
Litmus papers (red and blue)
Aqueous solutions of
- copper (II) sulphate
- iron (III) chloride
- zinc sulphate
- magnesium chloride

Procedure

Place one or two pellets of sodium hydroxide on a watch glass and observe the colour and appearance.

Observe the pellets again after a few minutes. Record any change in their appearance.

Place five pellets of sodium hydroxide in a boiling tube and add 10 ml of water. Stir the contents with a glass rod. Feel the outside of the tube. Test the solution with litmus papers.

Take 2 ml each of copper (II) sulphate, iron (III) chloride, zinc sulphate and magnesium sulphate solutions in separate test tubes. Add 3 ml of sodium hydroxide solution dropwise, in excess, to each solution and shake. Record your observations.

Take 2 ml of ammonium chloride solution in a test tube. Add 2 ml of sodium hydroxide solution to it and warm. Smell the gas evolved and test it with a moist red litmus paper. Hold a glass rod dipped in concentrated hydrochloric acid a little above the mouth of the tube. What do you observe ?

Repeat the above tests using potassium hydroxide.

Question

Explain what happens to sodium hydroxide when it is exposed to air.

20

Some reactions of alkali metal salts

In this experiment you will study some reactions of alkali metal salts.

Materials required

- Watch glass
- Test tubes 6
- Magnifying lens
- Splinter
- Sodium carbonate
- Sodium sulphate
- Sodium nitrate
- Potassium carbonate
- Potassium sulphate
- Potassium nitrate
- Litmus papers
- Cobalt chloride paper

Procedure

i) Take about 1 g of sodium carbonate in a test tube and heat it. Test the vapours, if any with (a) cobalt chloride paper and with (b) a glowing splinter.

ii) Dissolve a small amount of sodium carbonate in water and test the solution with litmus papers.

Repeat the above two tests with the rest of the given salts. Record your observations.

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Flame colouration of alkali metals

In this experiment you will study the characteristic flame colourations of the alkali metals.

Materials required

- Watch glass
- Splinters
- Blue glass
- Sodium carbonate
- Sodium sulphate
- Sodium chloride
- Sodium nitrate
- Potassium nitrate
- Potassium chloride
- Potassium sulphate
- Potassium carbonate

Procedure

Adjust the Bunsen burner to get a non-luminous flame. Ignite a splinter and when it begins to burn dip it into distilled water.

Place 1 g of sodium chloride on a watch glass. Prepare a paste of the salt by adding a few drops of water. Take this paste on the charred end of the splinter and introduce it into the flame. Observe the colour of the flame. Observe the flame through a blue glass. Is there any change in colour?

Repeat the above test with the other salts and record the colour of the flame.

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